Strategic Value Analysis

Geothermal Transmission Workshop
Interstate Transmission Capacity
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Interstate Transmission Capability

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Interstate Available Transfer Capability (ATC)

- Issues
  - What is the capability of the existing interconnections to import out of state resources in 2010 and 2017 to assist in meeting the renewable penetration requirement?
  - Is the California transmission infrastructure (230 kV and below) able to deliver power from the EHV to load centers?

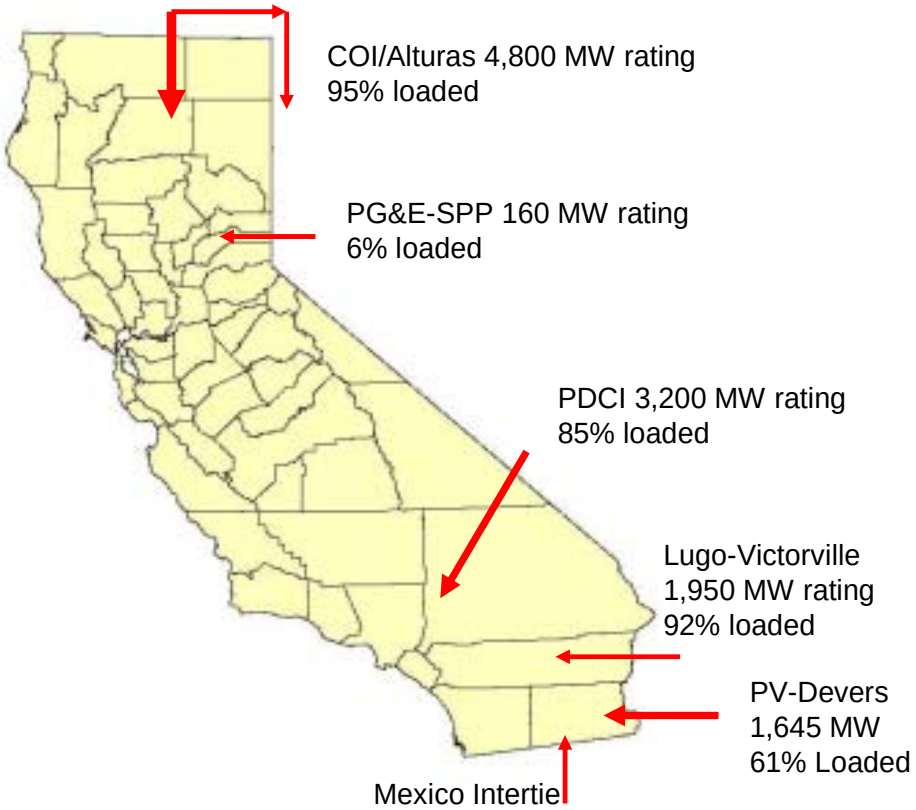
ATC Issues Continued

- What transmission planning studies and transmission developments need to be undertaken?
- Given the projected out-of-state renewable development that is being planned for delivery to the California border, is California able to reliability and economically import this power?

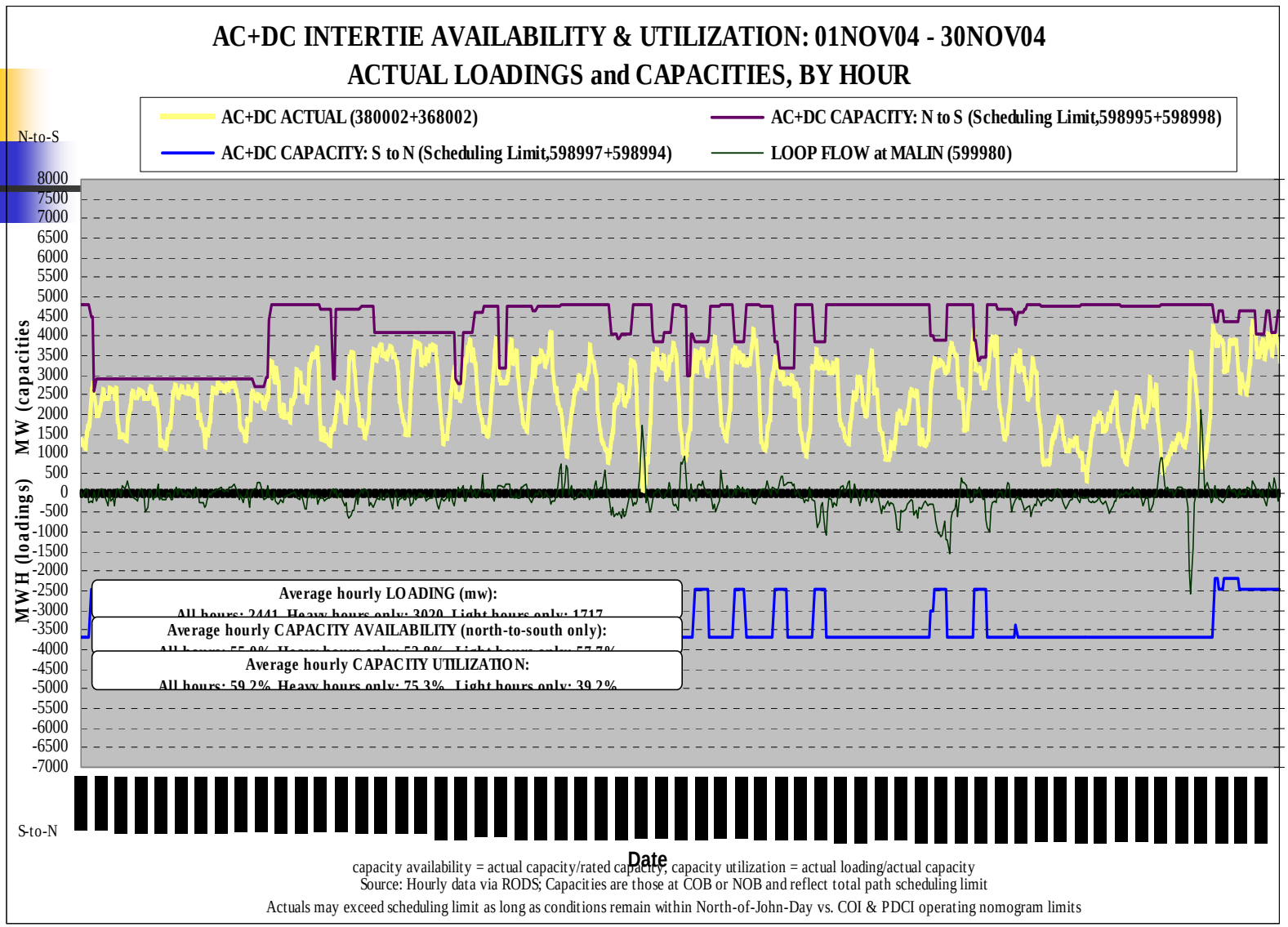
General Observations

- Historically, the transmission interconnections have not been loaded to their full rating
- However, in the 2010 and 2017 transmission power flows, these interconnections are being loaded to over 90% capacity
- Little room remains for importing new power

Projected 2010 Summer Peak Flows



AC+DC INTERTIE AVAILABILITY & UTILIZATION: 01NOV04 - 30NOV04
ACTUAL LOADINGS and CAPACITIES, BY HOUR



capacity availability = actual capacity/rated capacity; capacity utilization = actual loading/actual capacity

Source: Hourly data via RODS; Capacities are those at COB or NOB and reflect total path scheduling limit

Actuals may exceed scheduling limit as long as conditions remain within North-of-John-Day vs. COI & PDCI operating nomogram limits

Study Methodology

- Model three out-of-state renewable resource groups
- Model proposed high-voltage transmission upgrades
- Calculate peak hour available transfer capability from out-of-state renewable resource groups to California
- Determine how much power can be imported before transmission limits are reached

Out-of-State Resource Groups

Proposed Renewable Energy Resource Areas and Power Plant Capacities

Out-of-State Resource Groups

- Northwest Source
  - Columbia Valley Wind – 3000 MW
  - Southern Oregon Wind – 2000 MW
  - Southwest Idaho/Northern Nevada Wind – 1000 MW
- Reno Source
  - Reno Wind – 1000 MW
  - Reno Geothermal – 600 MW
  - Dixie Geothermal – 500 MW
- Southern Source
  - Las Vegas Solar – 1000 MW
  - Arizona Solar – 1000 MW

Proposed Transmission Upgrades

- California-Oregon intertie (COI), Pacific AC intertie (PACI), Alturas transmission line
- Trans-Sierra high-voltage line through Susanville
- Trans-Sierra high-voltage line through Truckee
- Pacific DC intertie (PDCI) tap in Northwest Nevada
- Palo Verde-Devers II

Conclusions

- Based on Available Transmission Capacity (ATC), COI/PACI is the limiting element for importing out-of-state renewables in all scenarios
- Contingency analysis of the California infrastructure (230 kV and below) cause the limitations
- Upgrading the 500 kV system will have limited benefit without upgrading infrastructure in parallel.

Results and Conclusions

- COI is vulnerable to in-state transmission outages and often limits import capacity from all sources
- Transmission upgrades must include in-state elements between interstate lines and load centers
- Load growth through 2017 places additional strains on the in-state network. Further study is required.

Presentation of Results

- DPC will be presenting its interstate transmission ATC results at the May 9, 2005 IEPR workshop